

Application Serial No. 10/797,425
Response dated July 29, 2005
Reply to Office Action dated June 30, 2005

AMENDMENTS TO THE CLAIMS

1. (Original) A method of fabricating a SiGe thin layer semiconductor structure, the method comprising:
 - providing a substrate having a dielectric layer thereon to a process chamber of a processing system;
 - forming a variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer over the dielectric layer; and
 - forming a Si cap layer on the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer.
2. (Currently Amended) The method according to claim 1, wherein the substrate comprises one of a semiconductor substrate, a LCD substrate, ~~and or~~ a glass substrate.
3. (Currently Amended) The method according to claim 1, wherein the dielectric layer comprises at least one of an oxide layer, a nitride layer, an oxynitride layer, ~~and or~~ a high-k layer.
4. (Currently Amended) The method according to claim 1, wherein the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer comprises ~~at least one of a graded $\text{Si}_x\text{Ge}_{1-x}$ layer with a graded Ge content and a plurality of $\text{Si}_x\text{Ge}_{1-x}$ sub-layers each with different Ge content.~~
5. (Currently Amended) The method according to claim ~~[[4]]~~54, wherein the graded Ge content in the $\text{Si}_x\text{Ge}_{1-x}$ layer is less than about 0.5.
6. (Original) The method according to claim 4, wherein the different Ge contents in the $\text{Si}_x\text{Ge}_{1-x}$ sublayers are less than about 0.5.
7. (Original) The method according to claim 4, wherein the different Ge contents in the $\text{Si}_x\text{Ge}_{1-x}$ sub-layers are less than about 0.3.

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8. (Original) The method according to claim 1, wherein forming the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer includes providing a graded Ge content, with the Ge content being in the range of about 0.2 to about 0.5 adjacent the dielectric layer and decreasing to a value of 0.1 or less adjacent the Si cap layer.

9. (Original) The method according to claim 1, wherein the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer comprises a first $\text{Si}_x\text{Ge}_{1-x}$ sublayer formed on the dielectric layer, the first $\text{Si}_x\text{Ge}_{1-x}$ sublayer having a Ge content between about 0.5 and about 0.3, and a second $\text{Si}_x\text{Ge}_{1-x}$ sublayer formed on the first $\text{Si}_x\text{Ge}_{1-x}$ sublayer, the second $\text{Si}_x\text{Ge}_{1-x}$ sublayer having a Ge content between about 0.15 and about 0.05.

10. (Original) The method according to claim 1, wherein the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer comprises a first $\text{Si}_x\text{Ge}_{1-x}$ sublayer formed on the dielectric layer, the first $\text{Si}_x\text{Ge}_{1-x}$ sublayer having a Ge content of about 0.2, and a second $\text{Si}_x\text{Ge}_{1-x}$ sublayer formed on the first $\text{Si}_x\text{Ge}_{1-x}$ sublayer, the second $\text{Si}_x\text{Ge}_{1-x}$ sublayer having a Ge content of about 0.1.

11. (Currently Amended) The method according to claim 1, wherein the providing comprises introducing a substrate into ~~one of a process chamber of a single wafer processing system and a process chamber of a batch type processing system.~~

12. (Original) The method according to claim 1, wherein the forming a variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer comprises exposing the substrate to a Si-containing gas and a Ge-containing gas in a chemical vapor deposition process.

13. (Currently Amended) The method according to claim ~~11~~12, wherein the Si-containing gas comprises at least one of SiH_4 , Si_2H_6 , SiH_2Cl_2 , ~~and or~~ Si_2Cl_6 , and the Ge-containing gas comprises at least one of GeH_4 ~~and or~~ GeCl_4 .

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14. (Currently Amended) The method according to claim 1, wherein the forming a Si cap layer comprises exposing the substrate to at least one of SiH_4 , Si_2H_6 , SiH_2Cl_2 , ~~and~~or Si_2Cl_6 in a chemical vapor deposition process.
15. (Original) The method according to claim 1, further comprising:
forming a Si-containing seed layer on the dielectric layer, wherein the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer is formed on the Si-containing seed layer.
16. (Currently Amended) The method according to claim 15, wherein the Si-containing seed layer comprises one of amorphous Si ~~and~~or poly-Si.
17. (Original) The method according to claim 15, wherein the Si-containing seed layer comprises a $\text{Si}_x\text{Ge}_{1-x}$ layer.
18. (Original) The method according to claim 15, wherein the Si-containing seed layer comprises a $\text{Si}_x\text{Ge}_{1-x}$ layer with Ge content of about 0.1, or less.
19. (Currently Amended) The method according to claim 15, wherein the forming a Si-containing seed layer comprises exposing the substrate to a Si-containing gas containing at least one of SiH_4 , Si_2H_6 , SiH_2Cl_2 , ~~and~~or Si_2Cl_6 in a chemical vapor deposition process.
20. (Original) The method according to claim 19, wherein the exposing further comprises exposing the substrate to an inert gas.
21. (Original) The method according to claim 19, wherein the exposing further comprises exposing the substrate to H_2 .

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22. (Original) The method according to claim 15, wherein the forming a Si-containing seed layer comprises performing an atomic layer deposition process.

23. (Original) The method according to claim 22, wherein the forming a Si-containing seed layer comprises alternately exposing the substrate to a Si-containing gas and H₂.

24. (Original) The method according to claim 22, wherein the forming a Si-containing seed layer comprises alternately exposing the substrate to a Si-containing gas, H₂, and a Ge-containing gas.

25. (Original) The method according to claim 1, wherein the forming further comprises heating the substrate to between about 500°C and about 900°C.

26. (Original) The method according to claim 1, further comprising providing a process chamber pressure less than about 100Torr.

27. (Original) The method according to claim 1, further comprising providing a process chamber pressure less than about 1Torr.

28. (Withdrawn) A computer readable medium containing program instructions for execution on a processor, which when executed by the processor, cause a processing apparatus to perform the steps in the method recited in claim 1.

29. (Withdrawn) A computer readable medium containing program instructions for execution on a processor, which when executed by the processor, cause a processing apparatus to perform the steps in the method recited in claim 15.

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30-53. (Canceled)

54. (New) The method according to claim 1, wherein the variable composition $\text{Si}_x\text{Ge}_{1-x}$ layer comprise a graded $\text{Si}_x\text{Ge}_{1-x}$ layer with a graded Ge content.

55. (New) The method according to claim 1, wherein the providing comprises introducing a substrate into a process chamber of a batch-type processing system.